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ABSTRACT

Learner objectives, text, practice exercises and answer sheets are provided on the history of educational technology, which includes three major periods: Audiovisual Instruction (1920-1945), Audiovisual Communications (1945-date), and Instructional Systems Analysis and Design (1950-date). The terms "educational technology" and "instructional technology" are defined; ideas, themes, and techniques characteristic of each period are discussed; and a few important contributors to educational technology are mentioned. The module concludes with a statement concerning the societal need for educational technology and speculation about the future of the field. A 7-item reference list and an 18-item test are included. (Author/LMM)

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Objectives:

After completing this module, the learner will be able to do the following, without referring to the module or to other materials:

1. Give the approximate year when, according to Finn, educational technology had its beginnings.

2. Name three early contributors to educational technology, and describe the work of each in a few words.

3. Name three major periods in the development of educational technology.

4. Give the years during which the Audiovisual Instruction Movement prevailed.

5. Name three characteristics of the Audiovisual Instruction Movement.

6. Give the years during which Audiovisual Communications has been developing.

7. Name three characteristics of Audiovisual Communications in its early (c. 1950) period.

8. Give the years during which Instructional Systems Analysis and Design began.

9. State Hoban's (1960) definition of a system.

10. Identify the person more responsible than anyone else for the expanded influence of learning theory in educational technology.

11. Name three outcomes of the influence of learning theory in educational technology.

12. Identify three components of an instructional system according to Ely (1963).

13. List 5-7 steps in the instructional or audiovisual communications process according to Ely (1963).

14. List three characteristics of audiovisual communications in the 1980's.

15. List three characteristics of instructional development.

16. Summarize the need for instructional technology in the 1980's in a paragraph of no more than five sentences.

17. Suggest two future developments in instructional technology. Limit your response to a short paragraph.

18. Suggest what you hope to do in the field of instructional technology. Limit your response to a few sentences.

Abstract:

The history of educational technology includes three major periods: Audiovisual Instruction (1920-1945), Audiovisual Communications (1945-date), and Instructional Systems Analysis and Design (1950-date). Within each of the last two periods, we can further discern an early period lasting until about 1960, and a period of later development which includes the present day.

Ideas, themes, and techniques characteristic of each period are discussed, and a few important contributors to educational technology are mentioned.

The module begins with definitions of the often confusing terms educational and instructional technology, and ends with a statement concerning the need in our society for educational technology and speculation about the future of the field.

Description of test:

A test with 18 questions exactly paralleling the objectives will be administered in class Week 3. If you can answer the practice questions, you will be able to pass the test.

Text and Practice Exercises:

INSTRUCTIONAL TECHNOLOGY - PAST, PRESENT, AND FUTURE

The Past - Introduction

Educational technology is a new field. James Finn (1967) established its beginnings in the 1920's. Educational technology developed in response to the industrialization and advancements in scientific and social scientific knowledge which characterized the late 19th and early 20th centuries. World War II provided further impetus to the field. Many other fields developed at the same time, including management, communications, systems theory, and computer and information science. Educational technology has adopted concepts, strategies, and techniques from each of these fields and from others.

The term instructional technology is even newer, and instructional technology is considered to be a part of educational technology. Educational technology also encompasses audiovisual communications and instructional development.

Instructional technology encompasses audiovisual communications as it is applied to instruction, and instructional development. Instructional technology is usually considered to mean the application of social scientific knowledge to instruction - that is, to teaching people how to do something in particular. Educational technology is the application of social scientific knowledge to education - that is, to the total process of preparing people for life.

As you go through the module, refer to these definitions to help you remember how these terms are used in the module. In the literature of educational technology, these terms are used interchangeably, which results in confusion.

Many individuals have contributed ideas and techniques to educational technology. Three educators working in the early 20th century contributed ideas which are part of the foundation of the field. Edward Thorndike developed the first theory of learning based on scientific research. He called his theory connectionism, and some of its laws contain concepts familiar to instructional technologists today. Throndike emphasized effects of satisfaction and annoyance on the learner.

John Dewey was an educational philosopher. He was responsible more than anyone else for the idea that education was life, and should be practical. In his book How We Think (1910), Dewey described instruction in terms of the scientific method. In his scheme, the learner sensed a problem or became aware of a goal and wanted to reach it. The learner then developed hypotheses as tentative answers, checked his observations agaist present knowledge or experiments to test the hypotheses, and drew conclusions.

William Heard Kilpatrick (1871-1965) popularized and further developed Dewey's work. Kilpatrick described the Project Method in 1918. The teacher helps initiate an activity, plan its implementation, conduct the activity according to plan, evaluate progress, change the plan as needed, keep lean learners aware of their thinking and of their progress toward an objective, and evaluates the whole process.

Maria Montessori (1870-1952) became interested in education through her work with children as a physician. She developed a theory of instruction and began applying it in 1907 in the first of the Children's Houses she established in Roman slums. Montessori espoused adaptation of instruction to individual learners, freedom from dependence on each other for both learner and teacher, and sensory discrimination. Children learned to distinguish colors, textures, size, shape, weight, and pitch through sight, sound, and touch. (Saettler, 1968).

Other individuals made important contributions to the development of educational technology, and the work of a few of them will be described in the sections which follow on each period in the history of the field. There are at least three such periods, and many writers have dientified five or more. We will examine three major periods:

The Audiovisual Instruction Movement, 1920-1945
Audiovisual Communications, 1945-date
Instructional Systems Analysis and Design, 1950-date .

Answer the following questions. Compare your answers to those given on the following page.

1. Give the approximate year when, according to Finn, educational technology had its beginnings.

2. Name three early contributors to educational technology, and describe the work of each in a few words.

3. Name three major periods in the history of educational technology.

ANSWERS

1. Give the approximate year when, according to Finn, educational technology had its beginnings.

1920, 1920's

2. Name three early contributors to educational technology, and describe the work of each in a few words.

Thorndike: first scientific theory of learning, connectionism, concern with effect of satisfaction and annoyance or learner

Dewey: popularized by Kilpatrick, scientific method used to describe instruction, saw education as life, practical

Montessori: developed theory of instruction, emphasized individual characteristics of learner, freedom from dependence on each other for learner and teacher, sensory discrimination

3. Name three major periods in the history of educational technology.

Audiovisual Instruction Movement, 1920-1945
Audiovisual Communications, 1945-date
Instructional Systems Analysis and Design, 1950-date

The first period in educational technology may be called the Audiovisual Instruction Movement. Visual instruction came first. Later, sound was added.

Proponents of visual aids stressed the value of those aids in making ideas more concrete. Visual aids were classified according to degree of concreteness along a variously expressed continuum, in general, the following: object - model - diagram or picture - verbal description. (Saettler, 1968).

Those active in the movement emphasized integrating visuals into the curriculum, but the focus remained on materials as aids, not as units of study. Concern with design, development, production, evaluation, and management of materials came about later (AECT, 1977). People tended to specialize in both production and distribution of materials by type of material (Saettler, 1979).

Work continued on developing abstract-concrete classification schemes until as late as 1954 when Edgar Dale set forth the Cone of Experience in his book Audiovisual Methods in Teaching. By the end of the period, research into comparative effectiveness of different types of audiovisual materials had begun. The attention of audiovisual experts, in addition, was shifting to communications and systems theory.

Practice Exercises

Answer the following questions. Compare your answers to those given on the following page.

1. During what years did the Audiovisual Instruction Movement prevail?

2. Name three characteristics of the movement. Limit your answer to three sentences.

ANSWERS

1. During what years did the Audiovisual Instruction Movement prevail?

1920-1945

2. Name three characteristics of the movement. Limit your answer to three sentences.

Visual aids were seen as making instruction more concrete.

Visual aids were classified according to degree of concreteness.

Concern of AV specialists was focused on the materials themselves.

People tended to specialize by type of material.

The 40 years since the end of World War II have seen the evolution of educational technology from elementary studies of human learning and use of audiovisual aids into audiovisual communications and instructional design and development as we know them. Some writers have shown these two disciplines as developing separately and converging between 1955 and 1960. Others see the two fields as distinct, although interrelated, which is how they are treated here. Before we review the development of audiovisual communications and instructional development, consider the context within which educational technolgy as we know it evolved.

The demands of World War II stimulated growth and change in the sciences and social sciences which now appear to be as far reaching as those stimulated by the Industrial Revolution. America entered World War II late and the war effort was tremendous. Historical accounts do not yet do justice to the intensive work of non-military personnel. When you begin to work, and to run across recollections from the War, and ephemeral documents produced at that time, you begin to realize that many ways of thinking and techniques we take for granted were first used during World War II.

During the War the U.S. Government produced hundreds of instructional films and described an approach to training we would call systematic. The immediate effect of World War II on educational technology was to make the systems approach popular, to turn attention to systems theory, and to introduce concern with communications theory.

The next period in educational technology can be called Audiovisual Communications, and may be said to have begun between 1945 and 1950, and to continue to the present day.

In the beginning of the period, the attention of audiovisual specialists shifted from audiovisual materials themselves to the process of communicating. Those involved showed the workings of educational materials with dynamic models for the first time. Berlo's (1960) model showing communication as involving a source, message, channel, and receiver became popular. Another term for this kind of model is S-M-C-R. Other models show feedback, or return communication from the receiver which occurs in real life.

Such models of communication are dynamic and consider the teacher, learner, content, and the five senses together for the first time in the development of educational technology (AECT, 1977).

Audiovisual communications specialists in the early years continued to produce and distribute materials, often specializing according to medium. Research into comparative effectiveness of different media was also done. Audiovisual communicators were, however, becoming concerned about the effect of their products on individual learners and beginning to look at their work as communication, rather than as materials production and distribution.

Before we consider more recent development in audiovisual communications, we must look at early instructional systems analysis and design.

Answer the following questions. Compare your answers to those on the following page.

1. Give the years during which Audiovisual Communications has been developing.

2. Name three characteristics of Audiovisual Communications in its early period. Use a few short phrases.

ANSWERS

1. Give the years during which Audiovisual Communications has been developing.

1945 - date or to the present

2. Name three characteristics of Audiovisual Communications in its early period. Use a few short phrases.

AV specialists concerned with process of communicating, not just with materials
dynamic models of communications like Berlo's S-M-C-R used
teacher, learner, content, the five senses considered together for the first time
AV specialists continued to specialize according to medium
research into comparative effectiveness of media done

The Past - Instructional Systems Analysis and Design - The Early Period, 1950-1960

At the same time that audiovisual specialists became more concerned with communications than with materials themselves, educational technologists also became interested in systems theory. Hoban (1960) defines a system as "an arrangement of components with a common purpose." Systems to educational technologists meant complete educational products, with all components arranged to provide instruction. Arranging components to achieve a purpose - instruction - was a new idea and was intended to result in greater efficiency in using the components.

Educational technologists became concerned also with refining the purpose of creating systems - instruction. During the 1950's the influence of the behavioral sciences, especially learning theory, on educational technology expanded a great deal. B.F. Skinner's work in programmed instruction was primarily responsible for this expansion. Skinner depicted teaching as arranging for occurrences of desired behavior and reinforcement of that behavior. Learning began to be defined as a permanent change in behavior as a result of practice and experience.

Concentration on a learner's behavior as the outcome of successful instruction led to specification of behavioral objectives, and to the use of those objectives as criteria on which to base evaluation of learning. Such testing is called criterion referenced evaluation (AECT, 1977).

Audiovisual communications specialists were intrigued by systems concepts and objectives, and incorporated these ideas into their work. They also expanded use of systems concepts beyond creating systems into using a systems approach.

Practice Exercises

Answer the following questions. Compare your answers to those given on the following page.

1. Give the years during which instructional systems analysis and design began.

2. State Hoban's (1960) definition of a system.

3. Who was primarily responsible for the expanded influence of learning theory in educational technology during the 1950's?

4. Name three outcomes of the influence of learning theory on educational technology.

The Past - Instructional Systems, 1950-1960 - Practice Exercises

ANSWERS

1. Give the years during which instructional systems analysis and design began.

1950-1960

2. State Hoban's (1960) definition of a system.

an arrangement of components with a common purpose

3. Who was primarily responsible for the expanded influence of learning theory in educational technology during the 1950's?

B.F. Skinner

4. Name three outcomes of the influence of learning theory on educational technology.

learning defined as a change in behavior
behavioral objectives
criterion referenced evaluation

Between 1960 and the early 1980's audiovisual communications and instructional systems analysis and design diverged in some respects more than in the early years. Yet the two fields are so closely related that many things we will say about audiovisual communications are characteristic also of instructional design and vice versa.

During the 1960's audiovisual communications was heavily influenced by systems concepts, but many of the people who were responsible for applying systems theory to audiovisual communications are also identified with instructional design. Much of the following discussion may seem to you like what you read or hear later about instructional design and development. If you feel that way, you are right.

Systems concepts brought audiovisual communicators to consider all possible methods of communicating and all possible media which might be incorporated in a system to make learning happen. Concern extended also to structuring messages to enhance learning. For the first time the focus was not at all on audiovisual materials, but on the process of communicating and learning. Materials enhanced that process when incorporated into instructional systems.

Donald P. Ely (1963) presented a model which showed the components of an instructional system: messages, media-instrumentation, people, methods, and environment. He also showed a systems approach to instructional design: goal specification - message selection - presentation and reception - response and evaluation - feedback. Communication was shown as a dynamic process in the same model (AECT, 1977).

Audiovisual communications has continued to develop since Ely's model was presented in 1963, but that model contains reference to most if not all of the important considerations in the field. AV communicators care about program objectives, evaluation in terms of those objectives, communication with the audience through the right medium, with a relevant message, at an appropriate level, the environment within which that communication takes place, and feedback from the audience.

AV communications has been characterized by increasing sophistication in communications devices since 1960. Instructional use of televsion has grown, especially closed circuit, cable, and satellite transmission. Multi image slide shows have all but replaced single projector shows for many applications, and slides have largely supplanted filmstrips. Computers now play a role, especially in integrating various components of instructional systems, particularly television with other media.

Practice Exercises

Answer the following questions. Compare your answers to those on the following page.

1. Identify major components of an instructional system according to Ely (1963).

The Present - AV Communications, 1960 - date- Practice Exercises, cont.

2. List 5-7 steps in the instructional or AV communications process according to Ely (1963).

3. List three characteristics of AV communications in the 1980's. Use a few short phrases.

The Present - AV Communications, 1960 - date - Practice Exercises

ANSWERS

1. Identify major components of an instructional system according to Ely (1963).

messages
media-instrumentation
people
methods
environment

2. List 5-7 steps in the instructional or AV communications process according to Ely (1963).

goal specification
message selection
presentation and reception
response and evaluation
feedback

3. List three characteristics of AV communications in the 1980's.

concern with any of the variables mentioned - objectives, evaluation, medium, level, message, environment, feedback

sophistication of equipment
TV - multi image - computer use

Between 1960 and 1980, instructional development as we think of it evolved. Instructional development can be defined as a systematic approach to designing and putting together instructional materials and programs. Instructional development includes a needs assessment, task and learner analysis, setting objectives, selecting instructional methods and materials to suit the learners and the content, implementation of the program with attention to environmental factors, and evaluation of the program based on the learners' achievement of instructional objectives. Some people distinguish between instructional design and instructional development by limiting instructional design to a part of the process, principally analyzing tasks and learners, setting objectives, and selecting methods and materials.

Instructional developers look at instructional products and programs as systems and parts of systems, with all components integrated to achieve a purpose. They use a systems approach to designing and developing instruction. They make use of learning and communications theory, emphasize objectives set in nore or less behavioral terms, and consideration of sender, receiver, message, and medium as important variables in instruction.

Instructional development is also concerned with management, particularly with establishing cost effective ways of delivering instruction, and with establishing good working relationships with clients and other instructional developers.

Behavioral science research, particularly in psychology of learning, has grown in the past 20 years, and has been important in the development of instructional technology. Task and learner analysis and selection of instructional methods and materials depend on principles of learning which have been largely established in the past 20 years.

Practice Exercises

Answer the following question. Compare your answer with that given the following page.

1. List three characteristics of instructional development.

The Present - Instructional Systems Analysis and Design - Practice Exercises

ANSWER

1. List three characteristics of instructional development.

systematic approach to designing instruction

steps in instructional development - needs assessment, task and learner analysis, setting objectives, selecting methods and materials, implementing program, evaluation

uses learning and communications theory

concerned with management, especially cost effectiveness and good working relations

The Future - Instructional Technology in the Late 1980's and 1990's

There are many predictions about what will happen in instructional development and audiovisual communications in the coming years. The need for systematic planning and design of instructional programs and materials is evident. AECT (1977) cites Finn's statements concerning the need:

> the knowledge explosion,
> the population explosion,
> the second industrial revolution,
> the long revolution (including democratic, industrial-scientific, and cultural revolutions),
> the need to re-make the public philosophy to fit the times,
> the introduction of technology on a large scale in society in general,
> the need to ensure an adequate supply of scientists to operate the technological society,
> the need for general education of all citizens about technology,
> the need to rapidly retrain people displaced by automation,
> the inevitable extension of technology in general society into the instructional process.

Read Roger Kaufmann's "The Prince and the Faceless, Nameless Child" in AVCR, 25(4), Winter, 1977, pages 423-425, which is another kind of statement about the need for instructional technology.

We can point to speculation about the future of both instructional development and audiovisual communications as applied to instruction. Optimistic forecasts see schools, colleges, and providers of continuing education including business and industry paying attention to the need for instruction, to characteristics of individual learners, establishing instructional objectives, designing programs according to estabilshed principles of learning, and evaluation of programs in terms of achievement of objectives. Constraints operating against use of the full instructional development process include the difficulty of stating precisely what the schools should teach, the length of time instructional development requires, ignorance of established principles of learning on the part of many educators and administrators, inability of educators to formulate objectives and lack of knowledge of or respect for criterion referenced evaluation.

Predictions concerning audiovisual communications center on expansion of home television, increased use of computer assisted instruction and electronic calculators in instruction, use of computer controlled videodisc equipment and computer controlled electronic transmission of information, satellite television transmission, and home computers. Use of instructional technology in the sense of communications equipment is seen as hope for transmitting more information to more people in more locations than teachers can possibly

do. There is also hope for providing through audiovisual communications more opportunity for practice and feedback to learners than teachers can provide. Constraints include development of equipment and software, and people's reluctance to accept instruction through mechanized means.

Practice Exercises

Answer the following questions. Compare your answers with those given on the following page.

1. Summarize the need for instructional technology in the 1980's in a paragraph of no more than five sentences.

2. Suggest two future developments in instructional technology.

3. State what you hope to do in the field of instructional technology.

ANSWERS

1. Summarize the need for instructional technology in the 1980's in a paragraph of no more than five sentences.

Use the points made by Finn (page 18), the article by Kaufmann, and your own thoughts if you wish to add them.

2. Suggest two future developments in instructional technology.

Mention any of those discussed on pages 18-19, and add your own thoughts if you wish.

3. State what you hope to do in the field of instructional technology.

We hope that after you have read this short history, and participated in class discussions, you will have some idea what you would like to do in this field. Your answer, of course, will be completely individual.

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ICIT 700 - Trends in Instructional Technology - Test

1 1. Give the approximate year when, according to Finn, educational technology had its beginnings.

3 2. Name three early contributors to educational technology, and describe the work of each in a few words.

3 3. Name three major periods in the histroy of educational technology.

1 4. During what years did the Audiovisual Instruction Movement prevail?

3 5. Name three characteristics of the movement. Limit your answer to three sentences.

1 6. Give the years during which Audiovisual Communications has been developing.

3 7. Name three characteristics of Audiovisual Communications in its early period. Use a few short phrases.

1 8. Give the years during which instructional systems analysis and design began.

1 9. State Hoban's (1960) definition of a system.

1 10. Who was primarily responsible for the expanded influence of learning theory in educational technology during the 1950's?

3 11. Name three outcomes of the influence of learning theory on educational technology.

5 12. Identify major components of an instructional system according to Ely (1963).

5 13. List 5-7 steps in the instructional or AV communications process according to Ely (1963).

3 14. List three characteristics of AV communications in the 1980's. Use a few short phrases.

3 15. List three characteristics of instructional development.

5 16. Summarize the need for instructional technology in the 1980's in a paragraph of no more than five sentences.

5 17. Suggest two future developments in instructional technology.

5 18. State what you hope to do in the field of instructional technology.

92-100A
79-88B
below 78- study + retake test

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